

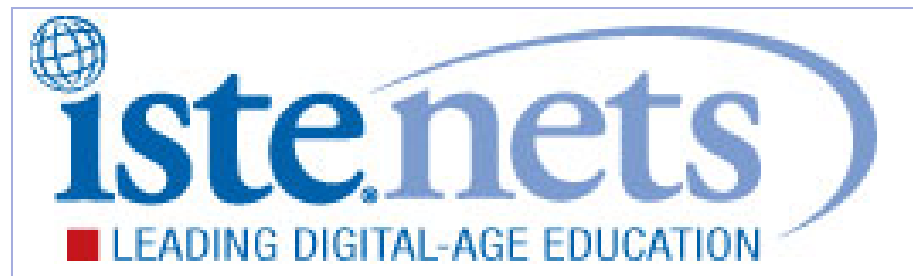
INTRODUCTION TO COMPUTERS AND INFORMATION TECHNOLOGY



Introduction to Computers and Information Technology

- ✓ Teaches essential computer technology concepts and skills:
 - How computers work (hardware, software, storage & operating systems)
 - Application basics (word processing, spreadsheets, databases, presentation graphics & multimedia)
 - Communications and networks (including smartphones, email and messaging systems and essential skills for finding information on the Internet)

Meets key national standards



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Note: Procedures for Office 2003, Office 2007 and Google Docs are on the Companion website

Career Corner

Service Technician Computer hardware sometimes fails. When that happens, people call service technicians. These people work for computer companies. They might work in the offices of the company that employs them, or they might travel to business sites to fix machines. Technicians need to know about software and hardware because problems are sometimes caused by a computer's programs and not by its equipment.

- Hard drives use a stack of disk platters to store large amounts of information permanently on the computer. External hard drives, which are plugged into the computer, are used to store back-ups of your data. They can be desktop or portable devices. They usually connect to the computer via a universal serial bus, or USB, port.
- Flash, jump, thumb, or pen drives—all names for the same kind of storage device—connect to the computer through a USB port. They hold anywhere from 4 gigabytes to as many as 32 gigabytes or more.
- Compact Discs (CDs) and Digital Video Discs (DVDs) are optical storage devices. You insert the CD or DVD into your computer through the disc drive. A CD can store 650 to 700 megabytes of data. DVDs can store anywhere from 4.7 gigabytes to double that amount if the DVD is double-sided. We'll learn more about different types of CDs and DVDs in Chapter 5.
- "Cloud" storage is online storage offered on various Web sites. Most of them will give you a few gigabytes for free, but then require you to pay for more space.

Secondary Storage Capacity Hard disk drives hold the most data. Many computers now have hard drives that can store several hundred gigabytes. A gigabyte is just over a billion bytes. Thumb or flash drives hold the next largest amount of data, sometimes going over 32 gigabytes. CDs and DVDs hold the least amount of data—from around 700 megabytes to almost 10 gigabytes. A megabyte is just over a million bytes, but still several hundred of them on a CD can store entire encyclopedias, including images, maps, and sound.



Figure 1.2.2 Today, nearly all computers feature a built-in hard drive, with capacities of 400 gigabytes or more.

Types of Software

Software is divided into two main types: system software and application software. **System software** includes programs that help the computer work properly. You are probably more familiar with **application software**, which are programs designed to help you do tasks such as writing a paper or making a graph. This type of software also includes programs that allow you to use the computer to listen to music or play games.

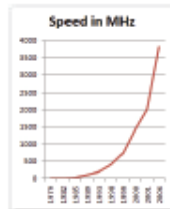
System Software

There are two types of system software: operating systems and system utilities. Both help computers run smoothly.

Operating Systems The operating system (OS) lets the hardware devices communicate with one another and keeps them running efficiently. It also supports the hardware when applications programs are running. The two most widely used operating systems are the Macintosh® OS and Microsoft® Windows®.

Did You Know?

One key to processor speed is its clock speed, the rhythm at which the processor works. Clock speed is measured in Gigahertz (GHz) and Megahertz (MHz). 1 GHz equals one billion cycles per second; 1 MHz equals one million cycles per second. The graph below shows the sharp rise in clock speed from 1982–2006.



Clock speed is not the only thing to consider when you select a processor, however. Speed is also influenced by factors such as the amount of RAM, clock speed of the RAM, and the size of the cache.



Spotlight on...

BILL GATES

“Bill Gates has the obsessive drive of a [computer] hacker working on a tough technical dilemma, yet [he also] has an uncanny grasp of the marketplace, as well as a firm conviction of what the future will be like and what he should do about it.”

Steven Levy
Writer

Bill Gates has a simple idea about the future of computing. “The goal,” he says, “is information at your fin-

gertips.” It will not surprise anyone if Gates and his company, Microsoft, play a major role in making that goal become a reality. Gates started writing software in high school. He and a childhood friend, Paul Allen, wrote a programming language to run on a machine called the Altair, the first personal computer. Allen and Gates then formed Microsoft, which is now one of the leading software companies in the world.



Technology@School

In some schools, students' work is collected over the year in electronic portfolios. These portfolios reflect a range of the students' work on many projects during the school year. The computer's ability to store this information is perfect for portfolio work.

Think About It!

Think about how an electronic portfolio might be used. Circle each item that you think could be in an electronic portfolio.

- ▶ multimedia presentations
- ▶ maps
- ▶ paper-and-pencil homework
- ▶ poetry
- ▶ lab report

Real-World Tech

Robots at Work Some output is very unusual. Computer-controlled robots work in some auto factories. Their output is cars. The robots are perfect for the tasks that take place on an assembly line. These tasks are done over and over again without change. For instance, robots weld parts together and paint car bodies.

What is a disadvantage to workers of bringing in robots to do tasks such as factory work? What can businesses and workers do to make that less of a problem?



Output

The third step shows what happens after the computer processes the data. This is the **output** step. If the program tells the computer to add two numbers, the output stage displays the result. To create output, the computer takes the bytes and turns them back into a form you can understand, such as an image on the screen or a printed document.

Output can take many forms. A program might convert the 0s and 1s into a report. It might become an image you are drawing on the computer. If you are playing a game, the output might be a car zooming along a road and the sound of its engine. A computer provides output through a device such as a monitor, speaker, or printer.

Storage

The fourth operation is **storage**, in which the computer saves the information. Without storage, all the work you do on the computer would be lost. Computers have a temporary memory that is used during the processing stage. When the computer is turned off, however, any data in that temporary memory is lost.

By storing the data in a permanent form, you can access the information over and over. This is another great advantage of computers—what you do one day can be saved and reused on another day.

Even images are formed by combinations of bytes. Those combinations tell the computer what colors to display and where to put them.

Processing

The second step of the information processing cycle is called **processing**. In this step, the computer does something to the data.

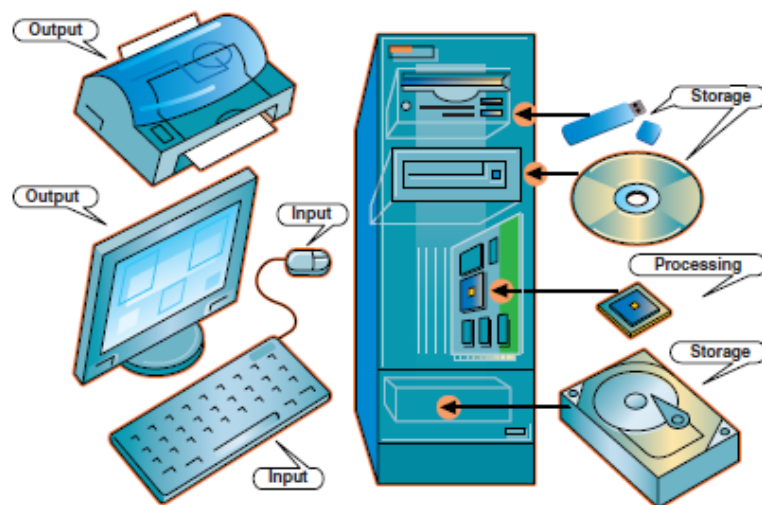
Coded Instructions What the computer does depends on the instructions, or program, given to the computer. The instructions are also written in binary code, using combinations of 0s and 1s. They might tell the computer to add two numbers, or they might have the computer compare two numbers to see which is larger.

Speed of Processing Computers can process data very rapidly, performing millions of operations every second. The ability to process data with lightning speed is another reason computers are so valuable.

Connections

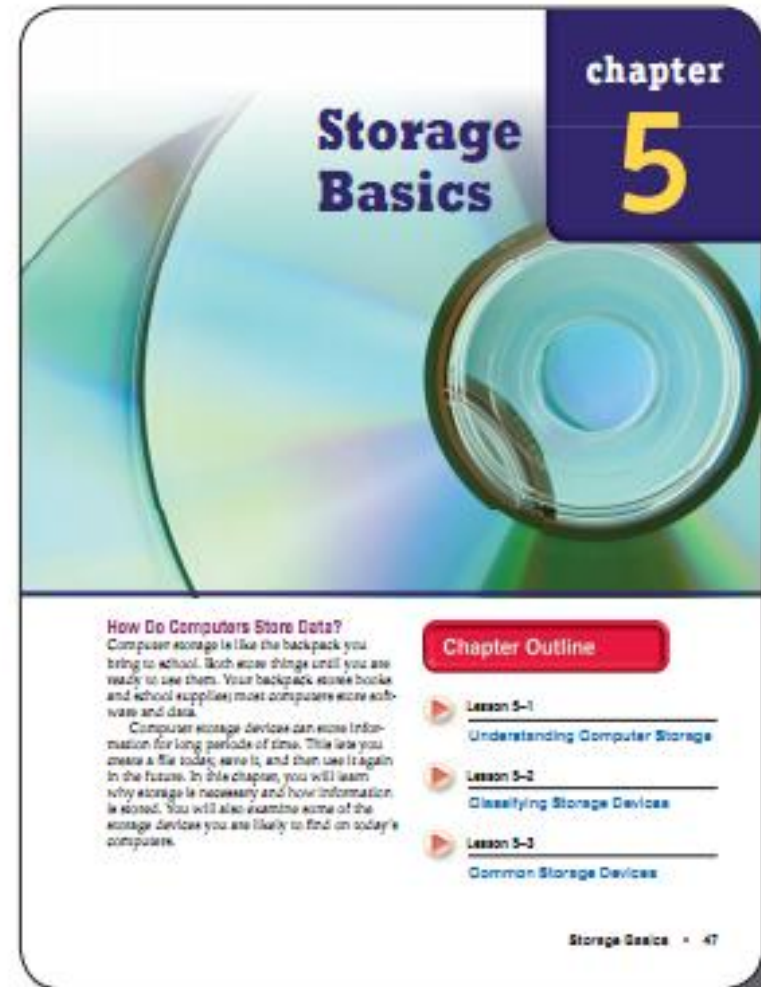
Math You ordinarily count using the decimal, or base 10, system. That system has 10 values, 0 through 9. But you can express many numbers using those values. You simply add additional places—the 10s, the 100s, and so on. Each place is 10 times larger than the previous place. In a binary system, the quantity represented by each place is 2 times the previous quantity. In an 8-digit binary number, the places are the 1s, 2s, 4s, 8s, 16s, 32s, 64s, and 128s.

Figure 1.1.1 Each computer component plays a role in one of the system's four primary functions.



Chapter Overview

Each chapter begins with an introduction to concepts and a chapter outline.



Lesson 5-1

Understanding Computer Storage

Objectives

- Explain the need for storage devices for computers.
- Distinguish between memory and storage.
- Distinguish between storage devices and media.

As You Read

Organize Information Use an outline to help you organize information about computer storage and storage devices as you read.

Key Terms

- Basic Input/Output System (BIOS)
- file
- memory
- storage device

Computer Storage Devices

Where do you store the books, pencils, and notebooks that you need for school? Many students keep them in a backpack. When class is about to begin, they pull out the things they need. When class is finished, they put the items back into their backpacks.

This is similar to the way storage devices work. They are the computer's hardware components that retain data even after the power is turned off. Suppose you turned off your computer without saving your work to a storage device. All your work would be lost. Without storage devices, you would have to re-create all of your work every time you wanted to use it.

Why not keep all of a computer's software and data available at all times? Because no one needs to use every program or file every time they work on the computer. For example, you might be doing word processing today, but needing a computer drawing tomorrow. There is no need to have both programs open at the same time if you are not using both of them.

Files A computer stores data and program instructions in files. A file is a collection of related information or program code, which has been given a unique name.



Figure 5.1.1 Like a backpack, a computer's storage devices hold things until you need them.

Lesson Overview

At the start of each lesson you will find helpful tools that guide you through the learning process.

As You Read Ideas for how you can best organize information for maximum learning.

Objectives Tasks you should be able to complete by the end of the lesson.

Key Terms Key words you should know after you complete the lesson.

Sidebar Features

Additional features in each chapter enhance and support the text.

Sequential Versus Random Access When equipped with a tape drive, business computers can store data on a long piece of tape, similar to an old-fashioned cassette tape. A tape drive is an example of a **sequential storage device**, which requires the computer to scan from the beginning of the medium to the end until it finds the data it needs. While cheaper and slower than other types of storage, the highest capacity tape cartridges can hold five terabytes of uncompressed data. Because it can take several minutes to locate a piece of data on a high-capacity tape, tapes are used chiefly by businesses that want to back up their computer systems—often after the business day is over.

A **random access storage device** lets a computer go directly to the needed information. The device does not have to search the entire medium to find data. For this reason, random access storage devices are much faster, and more expensive, than sequential devices. A hard drive is an example of a random access storage device.

Magnetic Versus Optical Storage Magnetic storage devices are specially treated disks or tapes, such as those mentioned above, that record information using magnetically sensitive materials. These devices use electricity to shift magnetic particles so they form a pattern that the computer reads and stores as information. Common magnetic storage devices include hard drives and tape drives.

Other storage devices use laser beams to read information that has been stored on the reflective surface of a disc. These are called **optical storage devices**. Popular types of optical storage devices for computers include CD-ROM and DVD-ROM drives.

Technology@ School

In addition to hardware, software, and peripherals, schools use storage devices such as hard drives and CD-ROMs/DVDs. Some schools have a dedicated computer "lab," but more and more schools have computers in every classroom. It's important for all students to treat computer equipment with care and use good, respectful conduct when doing tasks on school—or any—computers.

Think About It

Rate the computer equipment that you think is most sensitive to mishandling and needs the most care. On a scale of 1 to 5, use 1 for most sensitive and 5 for least.

- ▶ CD-ROM/DVD
- ▶ Flash drive
- ▶ Hard drive
- ▶ Power cord
- ▶ Laser printer

Technology@Home Technology@School Technology@Work

These include relevant information on how you can use the technology that you are learning about. They put the topics being discussed into real-world context.

Did You Know?

Interesting facts about technology are included in this feature.

Did You Know?

Most computers only have enough RAM to store programs and data while a computer is using them. This is because RAM is relatively expensive to make and to buy. As a result, makers of computers limit the amount of RAM in their machines to help lower initial computer costs and to allow users who want more RAM to purchase it separately.

Storage Versus Memory New computer users sometimes get confused about temporary memory (RAM) and permanent storage (disks and disk drives). They will say "memory" when they actually mean to say "storage." To avoid this problem, remember two key differences between storage and memory:

- The two work differently. Remember that RAM uses chips to temporarily store information. These chips depend on a constant supply of power to keep their contents; when the power is lost, the chips lose their contents. Storage uses different methods to store data permanently, so it isn't lost when the power is turned off.
- A PC has more storage capacity than memory. Even though some PCs have several gigabytes of RAM, their hard drives will be many times larger.

Storage Media and Storage Devices

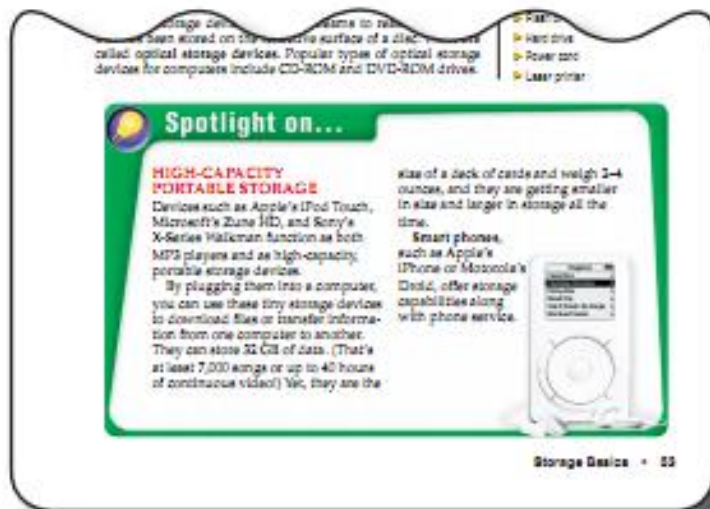
Storage has two components: **storage media** and **storage devices**.

Storage Media In terms of storage, a medium is an object that physically holds data or program instructions. Flash drives, magnetic tapes, compact discs, and DVDs are examples of storage media. (The word *media* is the plural of *medium*.)

Storage Devices A storage device is a piece of hardware that holds the storage medium, sends data to the medium, and retrieves data from the medium. Hard drives, flash drives, and CD-ROM drives are all examples of storage devices.

Additional Chapter Features

Throughout the text are Spotlight on... and Real-World Tech features.



▲ Spotlight on . . .

There are so many individuals who have made a difference in the technology that we use today. Spotlight on . . . highlights some of these people.



▲ Real-World Tech

This is a technology-awareness feature that introduces a technology concept relating to the current topic.

At the End of Each Chapter



Use the Vocabulary

Matching exercises to check your understanding of key terms in the chapter



Thinking Critically

Short-answer questions to demonstrate your understanding of concepts

Use the Vocabulary

Directions: Match each vocabulary term in the left column with the correct definition in the right column.

- | | |
|----------------------------------|---|
| 1. compress | a. name text into audio |
| 2. fax machine | b. print high-quality output suitable for photos |
| 3. optical character recognition | c. software that lets the computer play like an electronic instrument |
| 4. digital video camera | d. software that scans text and turns it into a digital file |
| 5. video capture card | e. memory on a video adapter |
| 6. video adapter | f. to make files smaller |
| 7. VRAM | g. captures still images, which are then shown rapidly |
| 8. thermal transfer printer | h. controls video output to the monitor |
| 9. speech synthesis software | i. converts analog video into digital |
| 10. MIDI | j. scans documents and sends them over phone lines |

Check Your Comprehension

Directions: Complete each sentence with information from the chapter.

- To play sound that has been stored in a computer, it must be converted to _____ format.
- Digital photos can be input from a camera by transporting them on a disk or sending them to the computer using a(n) _____.
- Three-dimensional graphics include height, width, and _____.
- DLP projectors are better than LCD projectors for giving a presentation to many people because the _____ appears _____.

Think Critically

Directions: Answer the following questions.

- What is one advantage of having memory on a video card dedicated to displaying graphics?
- Why are sound and graphics files compressed?
- Suppose someone had to scan ten images. Which kind of scanner would require him or her to stay closer to the machine as it is working, a sheetfed or flatbed? Why?
- Would a 3-D graphics adapter be needed on a machine used mostly for word processing and spreadsheets? Why or why not?
- Which kind of printer would be better for printing a report for school that included two or three photographs, an inkjet or a thermal transfer printer? Why?

Extend Your Knowledge

Directions: Choose one of the following projects. Complete the exercise on a separate sheet of paper.

- Divide a sheet of paper into two columns, creating a T-chart. Write the heading *Standard System* over the left column. Write the heading *Graphics System* over the right column. In each column, list the input and output components you would include if you were setting up these two computer systems. Include the type of output cards you would use. Assume that you have a 486 processor.
- Find out what kind of sound your computer can output. If possible, output audio and then determine what kinds of software your computer used to output the sound. Discuss for whom audio output is an advantage and when this feature is a necessity.



Check Your Comprehension

Questions to self-check your reading comprehension



Extend Your Knowledge

Projects incorporating all the skills you have learned in a fun and challenging activity

Teacher's Manual

Chapter 1 Computer Basics

Lesson Plan 1-1 What Is a Computer

Prepare and Engage

Objectives

1. Describe the four operations of computers.
2. Contrast analog and digital computers.
3. Explain why data and instructions for computers are coded as 0s and 1s.
4. Identify three benefits of computers.

Prepare a student simulation of the four basic actions of a computer.

Have four photos or other images ready for a student simulation. Review the four basic actions of a computer: input, processing, output, and storage.

Simulate the four basic actions of a computer.

Assign four students roles as Input, Processing, Output, and Storage. Give all four photos to Output. Choose one photo and tell Input. Input passes the information on to Processing, who prompts Output to display the correct photo and then passes it to Storage for later use.

Teach

- Have students read this lesson.
- For the As You Read activity, show students examples of sequence type charts, and make sure they understand how to prepare one.
- Review the key terms.

Teaching Tip

Make a copy of the illustration shown in Figure 1.1.1, but cover the names of the components. Distribute a copy to each student and ask them to label the components. Or, using a classroom computer, have students identify the various components.

Questions for Discussion

1. **What are the four actions of a computer's information processing cycle?** The four actions are input, processing, output, and storage.
2. **What are computer bytes and how are they organized?** Computer bytes are combinations of code that are made up of 0s and 1s and organized into multiples of eight or more.
3. **Why is storage one advantage of a computer?** Storage is an advantage because it saves the information that it has processed in some permanent form for access later.

Demonstrate Your Knowledge

Have students complete Demonstrate Your Knowledge 1-1 from the student workbook.

Student Workbook

Chapter 1

Name _____ Class _____ Date _____

Demonstrate Your Knowledge 1-1

Critical Thinking

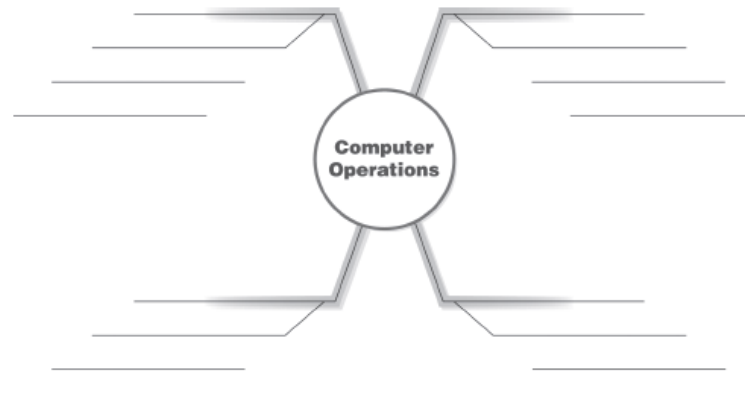
1. What is the difference between analog and digital computers?

2. Why must all data in a digital computer be in the form of 0s and 1s?

3. What are three benefits of computers?

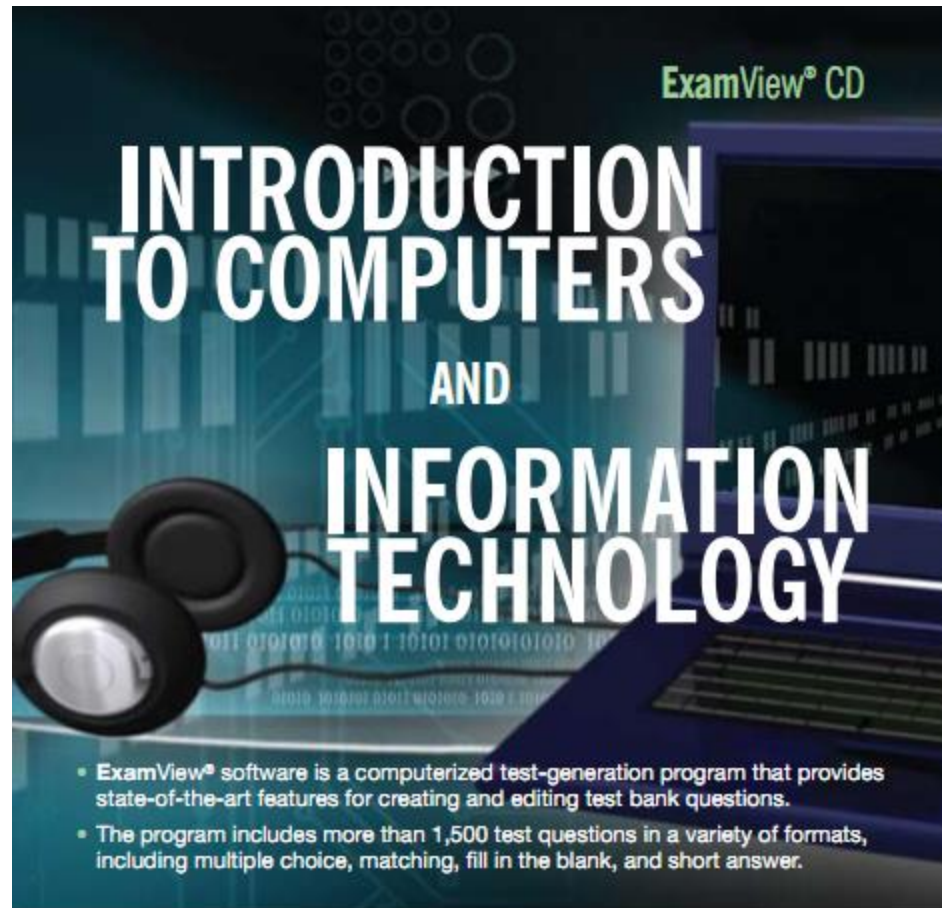
Activities

1. Look at the graphic organizer below. Complete the spider map by identifying the four steps in information processing. Then write at least two facts about each step.



2. As you move through your home, school, and community for a day, keep a log of how computers are used. Each time you see a computer in use, identify how it is being used. Report

ExamView CD-ROM



Companion Website

Includes:

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- ✓ Procedures for Google Docs and previous versions of Office
- ✓ Games and puzzles
- ✓ Language Arts activities
- ✓ Career clusters
- ✓ CTE student organizations

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Student Workbook	1-256-32034-X	\$15.97
Teacher's Manual	1-256-32035-8	\$59.97
ExamView CD-ROM	1-256-31273-8	\$75.97

Competition – Cengage



Pearson advantage

- ✓ Brand new title ©2012
- ✓ Written to meet IN standards
- ✓ Supports all versions of Office AND Google Docs
- ✓ Covers IC3 but so much more